CLAIMS

What is claimed is:

1. An apparatus including a video interface for a remote display, comprising:

a video processing circuit configured to output a modulated video signal, said modulated video signal having a data structure comprising a repetitive sequence of frame times, each said frame time containing substantially equal consecutive field times for each of three color fields, a portion of each said field time containing a burst of pixel luminance and control data;

a transceiver module comprising a cluster of infrared light-emitting diodes coupled to said video processing circuit for transmitting said modulated video signal;

a remote receiver configured to receive said modulated video signal; and

a remote electronic circuit interconnected to said receiver and to a video display device, said remote electronic circuit configured to apply said modulated video signal to control and drive said video display device.

2. The apparatus of claim 1, further configured such that said modulated video signal is transmitted from said video processing circuit to said receiver at least in part on a modulated beam of electromagnetic energy.

3. The apparatus of claim 2, wherein said modulated beam of electromagnetic energy is an infrared beam having a wavelength in a range of approximately 700 nm to approximately 1100 nm.

4. The apparatus of claim 2, including an optical fiber connecting said video processing circuit to said receiver, said modulated beam of electromagnetic energy propagating through said optical fiber.

5. The apparatus of claim 2, further configured such that said modulated beam of electromagnetic energy propagates to said receiver at least in part through a free atmospheric path.

6. The apparatus of Claim 6 wherein each diode in said cluster emits an identical optical signal.

7. The apparatus of Claim 1 wherein said cluster of light-emitting diodes is driven by a common modulated electrical source.

8. The apparatus of Claim 7 wherein said light-emitting diodes are driven in series by said common modulated electrical source.

9. The apparatus of Claim 7 wherein said cluster comprises a plurality of groups of light-emitting diodes, said groups, respectively, being driven in parallel by said common modulated electrical source.

10. The apparatus of Claim 9 wherein each light-emitting diode in the cluster emits an identical optical signal.

11. The apparatus of Claim 10 wherein said cluster comprises a first group and a second group of said light-emitting diodes, said first and second groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said first and second groups cancel each other.

12. The apparatus of Claim 11 wherein said cluster further comprises at least a third group and a fourth group of said light-emitting diodes, said third and fourth groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said third and fourth groups cancel each other.

13. The apparatus of Claim 1 wherein said cluster of light emitting diodes is interconnected with said video processing circuit through electrical cables.

14. The apparatus of Claim 1 wherein said cluster of light emitting diodes is interconnected with said video processing circuit through a coaxial cable.

15. The apparatus of Claim 1 wherein said receiver comprises a collecting lens assembly comprising:

a photodetector;

an inner light cone optically cemented to said photodetector, said inner light cone having diffusely reflecting outer walls; and

a wide-angle collecting lens coupled coaxially to said inner light cone.

16. The apparatus of Claim 15 wherein said collecting lens assembly further comprises an outer conic cavity disposed coaxially around said wide angle collecting lens and inner light cone, said outer conic cavity having polished reflective inner walls.

17. The apparatus of Claim 15 wherein said wide angle collecting lens is aspheric.

18. The apparatus of Claim 15, wherein said wide angle collecting lens is made of an optically transmitting polymeric material.

19. The apparatus of Claim 18, wherein said polymeric material is selected from the group consisting of polymethyl methacrylates and polycarbonates.

20. The apparatus of Claim 15 wherein said collecting lens assembly comprises a prismatic dispersiòn plate for widening a collecting angle of said assembly.

21. The apparatus of Claim 20 wherein said prismatic dispersion plate overlies said outer conic cavity.

22. The apparatus of Claim 15 wherein said collecting lens assembly comprises an asymmetrical prismatic pattern for widening a collecting angle of said assembly asymmetrically.

23. The apparatus of Claim 15 wherein said wide angle collecting lens and said inner light cone are an integrated monolithic structure.

24. The apparatus of Claim 1 further comprising a headset to be worn by a user, said headset incorporating said receiver and said video display device.

25. The apparatus of Claim 1 further comprising a tether interconnecting said video processing circuit and said transceiver, such that said modulated video signal is transmitted through said tether.

26. The apparatus of Claim 25 wherein said tether includes an electrically conducting coaxial cable, such that said modulated video signal is transmitted through said coaxial cable.

27. The apparatus of Claim 25 wherein said tether includes an optical fiber such that said modulated video signal is transmitted through said optical fiber.

28. The apparatus of Claim 1 wherein said remote electronic circuit is configured to illuminate said video display device sequentially with light from colored light emitting diodes in synchronism with said bursts of pixel luminance data, such that illumination occurs during a portion of each said field time not containing said burst.

29. The apparatus of Claim 28 further configured to operate two separate video display devices alternately, such that data bursts of a first video signal for a first display device alternate with corresponding data bursts of a second video signal for a second display device, and wherein said first and second video signals are derived from a single time-duplexed video data stream.

30. The apparatus of Claim 1 wherein said field time is in a range of approximately 4 msec to approximately 6 msec.

31. The apparatus of Claim 1 further configured to provide a video bandwidth of the order of or greater than 100 MHz.

32. The apparatus of Claim 1 wherein said video processing circuit is configured to convert a frame rate in an input video signal into a higher frame rate in said modulated video signal by repeated color fields.

33. The apparatus of Claim 1 wherein said modulated video signal incorporates an embedded audio signal.

34. The apparatus of Claim 1 further comprising a return audio link configured to propagate a return audio modulated signal from the proximity of said remote receiver to the proximity of said video processing circuit.

35. An apparatus including a video interface for a remote display, comprising:

a video processing circuit configured to output a modulated video signal;

a remote receiver; said receiver configured to receive said modulated video signal;

a remote electronic circuit interconnected between said receiver and a video display device, said remote electronic circuit configured to apply said modulated video signal to control and drive said video display device; and

a transceiver module comprising a cluster of infrared light-emitting diodes located proximate to said receiver, said transceiver module being configured to output said modulated video signal to said receiver at least in part through a free atmospheric path on a modulated beam of electromagnetic energy, such that said modulated beam of electromagnetic energy is directed substantially within a volume including the probable location of said receiver.

36. The apparatus of Claim 35 wherein said modulated beam of electromagnetic energy is an infrared beam having a wavelength in a range of approximately 700 nm to approximately 1100 nm.

37. The apparatus of Claim 36 wherein each diode in said cluster emits an identical optical signal.

38. The apparatus of Claim 37 wherein said cluster of light-emitting diodes is driven by a common modulated electrical source.

39. The apparatus of Claim 37 wherein said light-emitting diodes are driven in series by said common modulated electrical source.

40. The apparatus of Claim 35 wherein said cluster comprises a plurality of groups of light-emitting diodes, said groups, respectively, being driven in parallel by said common modulated electrical source.

41. The apparatus of Claim 35 wherein each light-emitting diode in the cluster emits an identical optical signal.

42. The apparatus of Claim 35 wherein said cluster comprises a first group and a second group of said light-emitting diodes, said first and second groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said first and second groups cancel each other.

43. The apparatus of Claim 42 wherein said cluster further comprises at least a third group and a fourth group of said light-emitting diodes, said third and fourth groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said third and fourth groups cancel each other.

44. The apparatus of Claim 35 wherein said cluster of light emitting diodes is interconnected with said video processing circuit through electrical cables.

45. The apparatus of Claim 35 wherein said cluster of light-emitting diodes is interconnected with said video processing circuit through a coaxial cable.

46. The apparatus of claim 35, wherein said receiver further comprises a collecting lens assembly incorporating:

a photodetector;

an inner light cone optically cemented to said photodetector, said inner light cone having diffusely reflecting outer walls; and

a wide-angle collecting lens coupled coaxially to said inner light cone.

47. The apparatus of Claim 46 wherein said collecting lens assembly further comprises an outer conic cavity disposed coaxially around said wide angle collecting lens and inner light cone, said outer conic cavity having polished reflective inner walls.

48. The apparatus of Claim 47 wherein said wide angle collecting lens is aspheric.

49. The apparatus of Claim 46 wherein said collecting lens assembly comprises a prismatic dispersion plate for widening a collecting angle of said assembly.

50. The apparatus of Claim 49 wherein said prismatic dispersion plate overlies said outer conic cavity.

51. The apparatus of Claim 46 wherein said collecting lens assembly comprises an asymmetrical prismatic pattern for widening a collecting angle of said assembly asymmetrically.

52. The apparatus of Claim 35 further comprising a headset to be worn by a user, said headset including said receiver and said video display device.

53. The apparatus of Claim 35 wherein said modulated video signal incorporates an embedded audio signal.

54. The apparatus of Claim 35 further comprising a return audio link configured to propagate an audio modulated signal from the proximity of said remote receiver to the proximity of said video processing circuit.

55. An apparatus including a collecting lens assembly comprising:

an inner light cone having diffusely reflecting outer walls;

a wide-angle collecting lens coupled coaxially to said inner light cone;

an outer conic cavity disposed coaxially around said wide-angle collecting lens, said outer conic cavity having polished reflective inner walls; and

a prismatic dispersion plate for widening a collecting angle of said assembly.

56. The apparatus of Claim 55 further comprising a headset configured to be worn by a user, said headset including said collecting lens assembly and a video display device.

57. The apparatus of Claim 55 wherein said wide-angle collecting lens is made of an optically transmitting polymeric material.

58. The apparatus of Claim 57 wherein said polymeric material is selected from the group consisting of polymethyl methacrylates and polycarbonates.

59. The apparatus of Claim 55 wherein said wide angle collecting lens and said inner light cone are an integrated monolithic structure.

60. An apparatus including a collecting lens assembly comprising:

an inner light cone having diffusely reflecting outer walls;

a wide-angle collecting lens coupled coaxially to said inner light cone;

an outer conic cavity disposed coaxially around said wide-angle collecting lens, said outer conic cavity having polished reflective inner walls; and

an asymmetrical prismatic pattern for widening a collecting angle of said assembly asymmetrically.

61. A method of operating a remote video display device, comprising:

generating a modulated video signal, said modulated video signal having a data structure comprising a repetitive sequence of frame times, each said frame time containing substantially equal consecutive field times for each of three color fields, a portion of each said field time containing a burst of pixel luminance and control data;

using a cluster of light-emitting diodes to transmit said modulated video signal to a remote receiver; and

applying said modulated video signal to control and drive said video display device.

62. The method of Claim 61 wherein said modulated video signal is transmitted on a modulated beam of electromagnetic energy.

63. The method of Claim 62 wherein said modulated beam of electromagnetic energy is an infrared beam having a wavelength in a range of approximately 700 nm to approximately 1100 nm.

64. The method of Claim 61 wherein said modulated beam of electromagnetic energy is transmitted to said receiver at least in part through a free atmospheric path.

65. The method of Claim 61 wherein using a cluster of light-emitting diodes to transmit said modulated video signal comprises causing each light-emitting diode in the cluster to emit an identical optical signal.

66. The method of Claim 61 wherein said cluster comprises a first group and a second group of said light-emitting diodes, said first and second groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said first and second groups cancel each other.

67. The method of Claim 66 wherein said cluster further comprises at least a third group and a fourth group of said light-emitting diodes, said third and fourth groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said third and fourth groups cancel each other.

68. The method of Claim 61 wherein said receiver comprises a collecting lens assembly comprising:

a photodetector;

an inner light cone optically cemented to said photodetector, said inner light cone having diffusely reflecting outer walls; and

a wide-angle collecting lens coupled coaxially to said inner light cone.

69. The method of Claim 68 wherein said collecting lens assembly further comprises an outer conic cavity disposed coaxially around said wide angle collecting lens and inner light cone, said outer conic cavity having polished reflective inner walls.

70. The method of Claim 68 wherein said wide angle collecting lens is aspheric.

71. The method of Claim 68 wherein said collecting lens assembly comprises a prismatic dispersion plate for widening a collecting angle of said assembly.

72. The method of Claim 71 wherein said prismatic dispersion plate overlies said outer conic cavity.

73. The method of Claim 68 wherein said collecting lens assembly comprises an asymmetrical prismatic pattern for widening a collecting angle of said assembly asymmetrically.

74. The method of Claim 61 wherein said receiver and said video display device are incorporated in a headset worn by a user.

75. The method of Claim 61 further comprising illuminating said video display device sequentially with light from colored light emitting diodes in synchronism with said bursts of pixel luminance data, such that said illuminating occurs during a portion of each said field time not containing said data burst.

76. The method of Claim 61 comprising operating two separate video display devices alternately, such that data bursts of a first video signal for a first display device alternate with corresponding data bursts of a second video signal for a second display device, and wherein said first and second video signals are derived from a single time-duplexed video data stream.

77. The method of Claim 61 further comprising converting a frame rate in an input video signal to a higher frame rate in said modulated video signal by repeating selected color fields.

78. The method of Claim 61 further comprising embedding an audio signal into said modulated video signal.

79. The method of Claim 61 further comprising transmitting a return audio modulated signal from the proximity of said remote receiver.

80. A method of operating a remote video display device, comprising:

generating a modulated video signal;

transmitting said modulated video signal on a modulated beam of electromagnetic energy through a free atmospheric path to a remote receiver; and

applying said modulated video signal to control and drive said video display device; and

using a cluster of light-emitting diodes to direct said modulated beam of electromagnetic energy within a volume including the probable location of said receiver.

81. The method of Claim 80 wherein said modulated beam of electromagnetic energy is an infrared beam having a wavelength in a range of approximately 700 nm to approximately 1100 nm.

82. The method of Claim 80 wherein using a cluster of light-emitting diodes to transmit said modulated video signal comprises causing each light-emitting diode in the cluster to emit an identical optical signal.

83. The method of Claim 80 wherein said cluster comprises a first group and a second group of said light-emitting diodes, said first and second groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said first and second groups cancel each other.

84. The method of Claim 83 wherein said cluster further comprises at least a third group and a fourth group of said light-emitting diodes, said third and fourth groups being arranged in an electronic dipole configuration such that the respective electromagnetic fields from said third and fourth groups cancel each other.

85. The method of claim 80 wherein said receiver comprises a collecting lens assembly incorporating:

a photodetector;

an inner light cone optically cemented to said photodetector, said inner light cone having diffusely reflecting outer walls; and

a wide-angle collecting lens coupled coaxially to said inner light cone.

86. The method of claim 85 wherein said collecting lens assembly further comprises an outer conic cavity disposed coaxially around said wide angle collecting lens and inner light cone, said outer conic cavity having polished reflective inner walls.

87. The method of claim 85 wherein said wide angle collecting lens is aspheric.

88. The method of Claim 85 wherein said collecting lens assembly comprises a prismatic dispersion plate for widening a collecting angle of said assembly.

89. The method of Claim 85 wherein said prismatic dispersion plate overlies said outer conic cavity.

90. The method of Claim 85 wherein said collecting lens assembly comprises an asymmetrical prismatic pattern for widening a collecting angle of said assembly asymmetrically.

91. The method of Claim 80 wherein said receiver and said video display device are incorporated in a headset worn by a user.

92. The method of Claim 80 further comprising embedding an audio signal in said modulated video signal.

93. The method of Claim 80 further comprising transmitting a return audio modulated signal from the proximity of said remote receiver.